University of Bahrain

Course: ITIS331 *Semester: 2013-1* *Date: December 19, 2013* *Time: 30min*

Instructor: Dr. Jihene Kaabi

9.6/10

Quiz 3 (out of 10)

excellent 2

19/20

Student name: .. ..Student ID#:... ..... Section:1

NOTES:

1. **Show all details of your answer.**
2. **Return a clean copy (without draft).**

Exercise:

One of the main products of the Swiss Veggie Company (SVC) is canned asparagus. The asparagus is canned at three canneries in Switzerland and then shipped to four distributing warehouses, one in southern Germany, one in western Austria, and two in Switzerland. The three canneries can supply the amounts (measured in truckloads) listed in the rightmost column of the table below. The demand at the warehouses (also measured in truckloads) is listed in the bottom row of the table.

	Warehouse 1	Warehouse 2	Warehouse 3	Warehouse 4	Supply
Cannery 1	40	66	80	36	450
Cannery 2	75	35	79	84	600
Cannery 3	78	40	79	54	500
Demand	500	200	300	300	1550

1300

The table also displays the cost of shipping a truckload from the canneries to the warehouses. Shipping cost represent a major expense to SVC. Obviously, it would like to satisfy the demand at the four warehouses as cheaply as possible. What shipping plan would minimize the total cost of shipping truckloads of canned asparagus from the canneries to the warehouses and what are the total costs for the optimal shipping plan?

1. Find an initial basic feasible solution using the North West Corner Method.

$x_{11} = 450$ $x_{24} = 50$

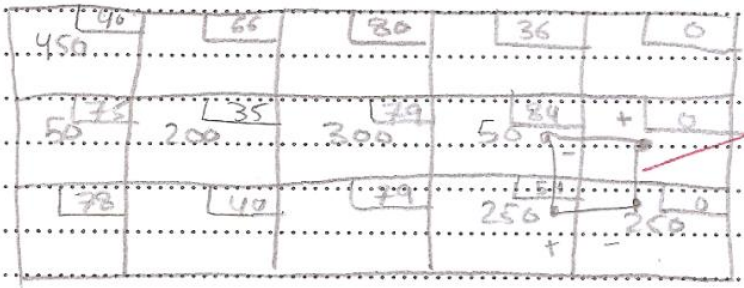
$x_{21} = 50$ $x_{34} = 250$

$x_{22} = 200$ $x_{35} = 250$

$x_{23} = 300$ all other variables are equals to zero

2

2. Find an optimal solution for the above given problem using MODI.



0,25

$u_1 + v_1 = 40$

$u_2 + v_1 = 75$

$u_2 + v_2 = 35$

$u_2 + v_3 = 79$

$u_2 + v_4 = 84$

$u_3 + v_4 = 54$

$u_3 + v_5 = 0$

$u_1 = 0$ $v_1 = 40$ $k_{12} = -66$ $k_{25} = 30$

$u_2 = 35$ $v_2 = 0$ $k_{13} = -36$ $k_{31} = -33$

$u_3 = 5$ $v_3 = 44$ $k_{14} = 13$ $k_{32} = -35$

$v_4 = 49$ $k_{15} = -5$ $k_{33} = -30$

$v_5 = -5$

1,75

2

3,5

$u_1 + v_1 = 40$

$u_2 + v_1 = 75$

$u_2 + v_2 = 35$

$u_2 + v_3 = 79$

$u_1 = 0$

$u_2 = 35$

$-u_3 = 35$

$v_1 = 40$

$v_2 = 0$

$v_3 = 44$

$v_4 = 19$

$v_5 = -35$

1,75

$u_2 + v_5 = 0$

$u_3 + v_4 = 54$

$u_3 + v_5 = 0$

$k_{12} = -66$

$k_{13} = -36$

$k_{14} = -17$

$k_{15} = -35$

$k_{24} = -30$

$k_{31} = -3$

$k_{32} = -5$

$k_{33} = -30$

1,75

2 | 3

2.b

the optimal solution is

$x_{14} = 450$

$x_{21} = 50$

$x_{22} = 200$

$x_{23} = 300$

$x_{25} = 50$

$x_{34} = 300$

$x_{35} = 200$ and all other variables are equal zero.

~~$Z = 47320$~~